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	Title	
	2008-2009 Small Game Harvest Survey	

**Abstract:** A biennial survey of Indiana small game hunters was conducted following the 2008–2009 hunting season and analyzed to determine harvest and hunter participation. Estimates derived from this survey were quantitatively compared to estimates from the most recent small game survey (2005–2006). A total of 192,103 people held a legal hunting license during the 2005–2006 season; up 7.6% from 178,471 license holders during the 2005–2006 season. Following the 2008–2009 season, questionnaires were delivered to 13,119 license holders and returned by 2,470 (18.8%). Correspondingly, the estimated number of people that actually hunted  $\geq 1$  small game species was 135,639, up 12.1% from 121,022 during the 2005–2006 season. Hunter participation declined for cottontail, bobwhite, pheasant, grouse, woodcock, raccoon, opossum, and gray fox, but increased for fox and gray squirrel, mourning dove, American crow, red fox, and eastern coyote. Total harvests in 2008–2009 declined for bobwhite, pheasant, grouse, opossum, and gray fox, but increased for fox and gray squirrels, doves, woodcock, crow, raccoon, red fox, and coyote. There was no apparent change in the cottontail harvest between years.

**Project #: 300FW0WILD07000 Activity # WILD521**

The harvest survey is one of the primary management tools used by the Division of Fish and Wildlife to accomplish its responsibility to protect and properly manage the wildlife of Indiana. Small game harvest surveys have been conducted in Indiana from 1940–1966, 1976–1999, and in 2000, 2003, 2005, and 2008. For the purpose of these harvest surveys, small game species include eastern cottontail (*Sylvilagus floridanus*), northern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus carolinensis*), mourning dove (*Zenaida macroura*), northern bobwhite (*Colinus virginianus*), ring-necked pheasant (*Phasianus colchicus*), ruffed grouse (*Bonasa umbellus*), American woodcock (*Scolopax minor*), American crow (*Corvus brachyrhynchos*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), Virginia opossum (*Didelphis virginiana*), and eastern coyote (*Canis latrans*). Most people hunting small game in Indiana must

purchase a hunting license. Participation and harvest estimates derived from this survey do not include people exempt from purchasing a license.

### Methods

Following the 2008–2009 small game season, a harvest survey questionnaire (Figure 1) was initially sent to 15,000 license holders. Each returned survey was entered into our database as they came in, and the data analysis did not begin until September 2009. Correction factors developed from the 1984 and 1985 surveys were used to adjust harvest estimates for response and non-response bias (Pringsten 1980, Rolley 1987, Frawley 1997). For analysis purposes, the state was stratified into 6 small game harvest regions (Figure 2B) or 5 ring-necked pheasant harvest regions (Figure 2A). If less than 10 surveys were received for any one species in a particular region, it was determined that the data was insufficient to provide reasonable estimates for



the harvest parameters, and the data was excluded from all descriptions in this report (Veverka 2008). Harvest and effort parameters derived for this report were quantitatively compared to the same parameters calculated in the most recent small game survey, 2005–2006 (Veverka 2009).

## **Results**

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Initially sent to 15,000 Indiana hunting license holders, 13,119 Questionnaires were delivered successfully. A total of 2,470 people returned questionnaires yielding an 18.8% response rate. The reported response rate was similar to the 19.0% rate observed for the 2003–2004 survey, but was much lower than the 26.2% rate observed for the 2005–2006 survey. The total number of hunting license holders in Indiana during the 2008–2009 season was 192,103, up 7.6% from the 2005–2006 estimate of 178,471. Of 2,470 questionnaires returned by license holders, a total of 1,744 (70.6%) actually hunted  $\geq 1$  small game species during the 2008–2009 season, resulting in an estimate of 135,639 small game hunters, a 12.1% increase from 2005–2006 (Figure 3). The following harvest data has been broken down for each species. (The percentages in parenthesis show the increase or decline in participation or harvest compared to the survey conducted after the 2005–2006 season)

### ***Eastern Cottontail***

An estimated 69,453 cottontail hunters (–3.5%) harvested an estimated 198,701 (–0.1%) in Indiana during the 2008–2009 season. Hunters in southwest Indiana had the greatest success averaging 0.82 cottontails harvested per hunting effort. The average cottontail hunter in Indiana spent 4.3 days in the field (–4.6%) and harvested 2.9 cottontails (+3.5%) during the 2008–2009 season.

### ***Fox Squirrel***

An estimated 76,608 fox squirrel hunters (+8.3%) harvested an estimated 315,367 fox squirrels (+24.1%) in Indiana during the 2008–2009 season. Hunters in the northwest and southwest had the greatest success averaging 0.86 and 0.85 fox squirrels harvested per hunting effort, respectively. The average fox squirrel hunter in Indiana spent 5.5 days in the field (+5.9%) and harvested 3.1 fox squirrels (+14.6%) during the 2008–2009 season.

### ***Gray Squirrel***

An estimated 51,798 gray squirrel hunters

(+12.0%) harvested an estimated 161,546 gray squirrels (+52.6%) in Indiana during the 2008–2009 season. Hunters in south-central Indiana had the greatest success averaging 0.74 gray squirrels harvested per hunting effort. The average gray squirrel hunter in Indiana spent 5.9 days in the field (+14.7%) and harvested 3.1 gray squirrels (+36.2%) during the 2008–2009 season.

### ***Mourning Dove***

An estimated 33,599 dove hunters (+12.9%) harvested an estimated 151,294 mourning doves (+23.9%) in Indiana during the 2008–2009 season. Hunters in the northwest and southwest had the greatest success averaging 2.71 mourning harvested per hunting effort. The average dove hunter in Indiana spent 1.9 days in the field (–4.2%) and harvested 4.5 mourning doves (+9.7%) during the 2008–2009 season.

28.3% of dove hunters hunted managed dove fields on 21 DNR-owned properties. The most popular DNR-owned properties were Willow Slough FWA (3.2%), Mississinewa Lake (2.5%), and Kingsbury FWA (2.1%).

### ***Northern Bobwhite***

An estimated 13,999 bobwhite hunters (–33.8%) harvested an estimated 21,102 bobwhites (–27.6%) in Indiana during the 2008–2009 season. Hunters in southwest Indiana had the greatest success averaging 0.66 bobwhites harvested per hunting effort. The average bobwhite hunter in Indiana spent 3.1 days in the field (+13.1%) and harvested 1.5 bobwhites (+9.4%) during the 2008–2009 season.

### ***Ring-necked pheasants***

An estimated 11,200 pheasant hunters (–29.8%) harvested an estimated 7,493 wild ring-necked pheasants (–34.6%) in Indiana during the 2008–2009 season. Hunters in the major region (Figure 2a) had the greatest success averaging 0.49 wild ring-necked pheasants harvested per hunting effort. The average pheasant hunter in Indiana spent 1.9 days in the field (–6.6%) and harvested 0.67 wild ring-necked pheasants (–6.8%) during the 2008–2009 season. Additionally, 12,055 hunters (–26.9%) harvested 34,014 game-farm or “Put-and-Take” pheasants (–29.4%), averaging 2.1 pheasants per day of effort (–7.9%).

### ***Ruffed Grouse***

An estimated 1,555 grouse hunters (–31.1%) harvested an estimated 120 ruffed grouse (–62.7%) in Indiana during the 2008–2009 season. Hunters in south-central Indiana had the greatest success averaging 0.04 ruffed grouse

harvested per hunting effort. The average grouse hunter in Indiana spent 1.8 days in the field (+32.0%) and harvested 0.08 ruffed grouse (-45.9%) during the 2008–2009 season.

#### ***American Woodcock***

An estimated 2,333 woodcock hunters (-38.3%) harvested an estimated 1,725 American woodcock (+35.7%) in Indiana during the 2008–2009 season. Data was insufficient to calculate regional success. The average woodcock hunter in Indiana spent 1.5 days in the field (+11.1%) and harvested 0.7 American woodcock (+119.7%) during the 2008–2009 season.

#### ***American Crow***

An estimated 11,822 crow hunters (+5.2%) harvested an estimated 42,202 crows (+19.2%) in Indiana during the 2008–2009 season. Hunters in southwest Indiana had the greatest success averaging 2.4 crows harvested per hunting effort. The average crow hunter in Indiana spent 2.3 days in the field (+10.4%) and harvested 3.6 crows (+13.2%) during the 2008–2009 season.

#### ***Raccoon***

An estimated 17,577 raccoon hunters (-4.3%) harvested an estimated 149,397 raccoons (+8.5%) in Indiana during the 2008–2009 season. Hunters in southwest Indiana had the greatest success averaging 0.91 raccoons harvested per hunting effort. The average raccoon hunter in Indiana spent 10.2 days in the field (+16.8%) and harvested 8.5 raccoons (+13.4%) during the 2008–2009 season.

#### ***Virginia Opossum***

An estimated 2,898 opossum hunters (-30.6%) harvested an estimated 4,212 opossums (-60.2%) in Indiana during the 2008–2009 season. Data was insufficient to calculate regional success. The average opossum hunter in Indiana spent 10.6 days in the field (+52.4%) and harvested 1.5 opossums (-42.7%) during the 2008–2009 season.

#### ***Red Fox***

An estimated 8,322 red fox hunters (+2.3%) harvested an estimated 2,372 red fox (+8.1%) in Indiana during the 2008–2009 season. Hunters in south-central Indiana had the greatest success averaging 0.07 red fox harvested per hunting effort. The average red fox hunter in Indiana spent 6.8 days in the field (+44.2%) and harvested 0.28 red fox (+5.6%) during the 2008–2009 season.

#### ***Gray Fox***

An estimated 5,055 gray fox hunters (-17.0%)

harvested an estimated 415 gray fox (-69.0%) in Indiana during the 2008–2009 season. Hunters in northeast Indiana had the greatest success averaging 0.04 gray fox harvested per hunting effort. The average gray fox hunter in Indiana spent 6.4 days in the field (+35.1%) and harvested 0.01 gray fox (-94.2%) during the 2008–2009 season.

#### ***Coyote***

An estimated 31,576 coyote hunters (+12.4%) harvested an estimated 29,128 coyotes (+29.3%) in Indiana during the 2008–2009 season. Hunters in south-central Indiana had the greatest success averaging 0.32 coyotes harvested per hunting effort. The average coyote hunter in Indiana spent 4.8 days in the field (+28.5%) and harvested 0.92 coyotes (+15.0%) during the 2008–2009 season.

#### ***Striped Skunk***

There was insufficient data to calculate any statewide or regional estimates regarding striped skunks.

#### ***Land Use and Access***

The small game harvest survey addressed several additional questions related to hunting of private and public land and access to private land. 92.6% of small game hunters pursued game on private land during the 2008–2009 season. Also, 39.5% of small game hunters pursued game on public land. However, fewer hunters exclusively hunted either private land (60.5%) or public land (7.4%). Hunters residing in the south-central small game region hunted both public and private land (39.6%) more than those from other regions of the state. Hunters from the northeast (65.6%) and southeast (64.6%) regions were more likely to hunt exclusively on private land, while non-residents (14.3%) and hunters from the northwest region (13.1%) were most likely to hunt public land exclusively.

91.7% of small game hunters asked permission to hunt on private land, with non-residents being least likely to ask permission (82.1%). Of those small game hunters who asked permission, 6.7% were denied access to private land, with residents of the northwest region most likely to be denied access (12.2%).

#### ***Discussion***

Although there has been a long-term decline in small game license holders (Figure 3), we observed an increase in the number of license holders between 2005 and 2008. Along with this

increase in the overall number of license holders, estimated participation by hunters pursuing fox and gray squirrels, mourning doves, crows, red fox, and coyotes also increased. However, we again observed significant declines in the estimated participation by hunters pursuing bobwhites, pheasants, grouse, and woodcock. With the exception of pheasant hunters, these dwindling bird hunters put in more of an effort to find their quarry. This worked well for woodcock hunters who saw a 97.8% increase in their harvest per day of effort. However, for bobwhite and ruffed grouse, increased efforts did not translate into an increased harvest per day of effort. Despite the increase in license holders during the 2008-2009 season, we reached record lows for both hunters and harvests of cottontails, bobwhites, wild pheasants, and ruffed grouse. We also saw a record low in hunters of woodcock, and harvest of opossums and gray fox.

Looking a bit closer, the harvest per effort index shows an increasing trend for all non-furbearer small game species, with the exception of ruffed grouse and squirrels, over the last 25-year period. We know from research that as hunter numbers decline, the hunters that continue to pursue a certain species are more effective in finding that species to harvest. The decline in the squirrel harvest per effort index can most likely be attributed to increased inexperienced youth hunters and adjustments to season dates that make locating squirrels more difficult. The significant long-term decline in the harvest per effort index for ruffed grouse is much more troubling. This decline is indicative of a declining population.

The number of hunters pursuing furbearers has declined over the last decade, but we have not seen the precipitous drop off of both hunters and harvest as with other small game species. Hunters continue to enjoy good harvest numbers for raccoons and coyotes. However, both red fox and gray fox have experienced declining numbers for more than a decade, most likely attributed to the increasing coyote population. Additionally, gray fox numbers have significantly declined over the last three harvest surveys, attributed to not only increasing coyote populations, but significant habitat loss.

Small game species need early successional habitat, along with quality forage and adequate year-round cover. These types of habitat are significantly lacking in Indiana, and the

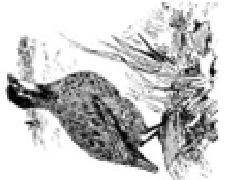
additional loss of Conservation Reserve Program land over the next few years will likely have a detrimental effect on some populations of small game. We must create and maintain suitable habitat for all small game species and continue to manage the harvest in the best interest of the species. Without these efforts, small game populations will continue to decline.

### Literature Cited

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Figure 1. Example of the 2009 Small Game Harvest Questionnaire sent to 15,000 license holders following the 2008-2009 Hunting Season.



## Small Game Harvest Questionnaire

State Form 28455 (8-14-08-09)

**Dear License Holder:**

The Indiana Division of Fish and Wildlife is conducting a special survey of small game hunters used to determine harvest and hunter participation. The information you provide will help us improve the management of our small game species. Your answers to this survey are important, even if you did not hunt any small game. Please take a few minutes to fill out this survey and return it immediately. If you answer "Yes" to hunting a specific animal, you must provide a county, the days hunted, and the total harvest. If these spaces are left blank, the information will not be used. If you prefer to complete this survey on the internet, please go to: [www.dnr.in.gov/SGHSurvey](http://www.dnr.in.gov/SGHSurvey)

Thank you for your time ©

**PART I: General Information**  
(Complete if possessing an '08-'09 Hunting License)

- What is your county of residence?  
(If non-resident, write "NR" below)  
\_\_\_\_\_
- Did you hunt any of the small game or furbearer species listed on this questionnaire during the 2008-2009 Indiana hunting season?  
Yes \_\_\_ No \_\_\_

**PART II: Small Game and Furbearers**  
(Complete only if you answered yes to question 2)

Please complete the following table about your small game hunting activities in Indiana during the 2008-2009 season. (If totals are unknown, you may estimate, but please be as accurate as possible)

	Did you hunt this animal in Indiana? Please check yes or no for each animal.		County most often hunted (only one)	Days hunted + required	Total Harvest + required
	Yes	No			
Rabbit					
Fox squirrel					
Gray Squirrel					
Mourning dove					
Pheasant (wild only)					
Pheasant (pen-raised)					
Belted quail					
Ruffed grouse					
Am. woodcock					
Common crow					

4. Please complete the following table only if you used dogs or predator calls to hunt furbearers in Indiana during the 2008-2009 season. (Please do not include your trapping efforts or any animals captured in traps)

	Did you hunt this furbearer in Indiana? Check yes or no for each animal.		County most often hunted (only one)	Days hunted + required	Total Harvest + required
	Yes	No			
Raccoon					
Opossum					
Skunk					
Red Fox					
Gray Fox					
Coyote					

**PART III: Private & Public Land Use**

- During the 2008-2009 season, did you hunt on:  
\_\_\_ Private land only? \_\_\_ Public land only?  
\_\_\_ Both Private and Public land?
- Did you ask permission to hunt private land?  
Yes \_\_\_ No \_\_\_
- Were you granted permission to hunt private land?  
Yes \_\_\_ No \_\_\_
- Did you hunt on any of the Fish & Wildlife Area-managed dove fields during the 2008-2009 season?  
Yes \_\_\_ No \_\_\_ FWA Name \_\_\_\_\_
- Did you participate in any of the Fish & Wildlife Put-and-Take Pheasant hunts during the 2008-2009 season?  
Yes \_\_\_ No \_\_\_ FWA Name \_\_\_\_\_

**RETURNING THE SURVEY**

NO POSTAGE IS NECESSARY. After you have answered the questions, please fold so the business reply label is on the outside. Then, tape the survey closed and drop it in the mail.




Figure 2. Maps showing Indiana's (A) pheasant harvest regions and (B) small game (excluding pheasant) harvest regions.

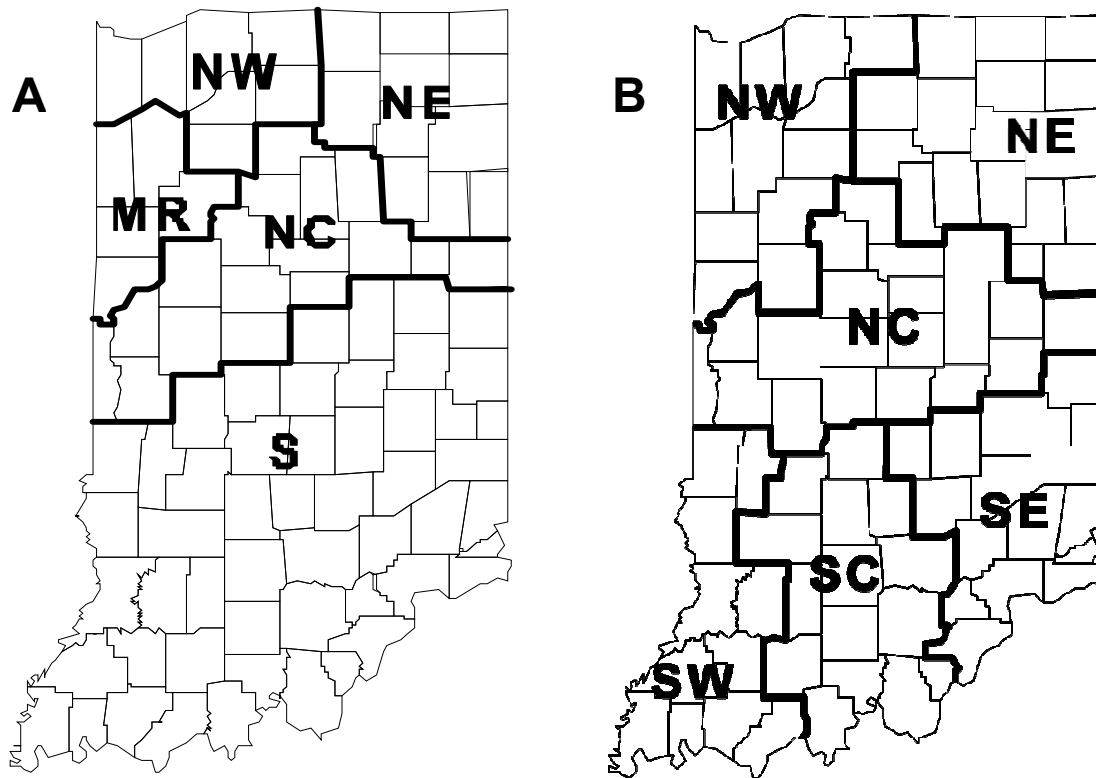


Figure 3. The estimated annual number of small game hunters in Indiana 1976-2008 (trend line shown; survey was not conducted in years displaying no data).

